

# San Francisco Sewer Inspection Methodology Presentation

October 13, 2016

# “Traditional” Methodology

1. Pan & Tilt Camera
2. Panoramio 360 Camera (Est. Starting 2010)
3. Walking Inspection (For Larger Structures)

## Pan & Tilt Camera (Sample)



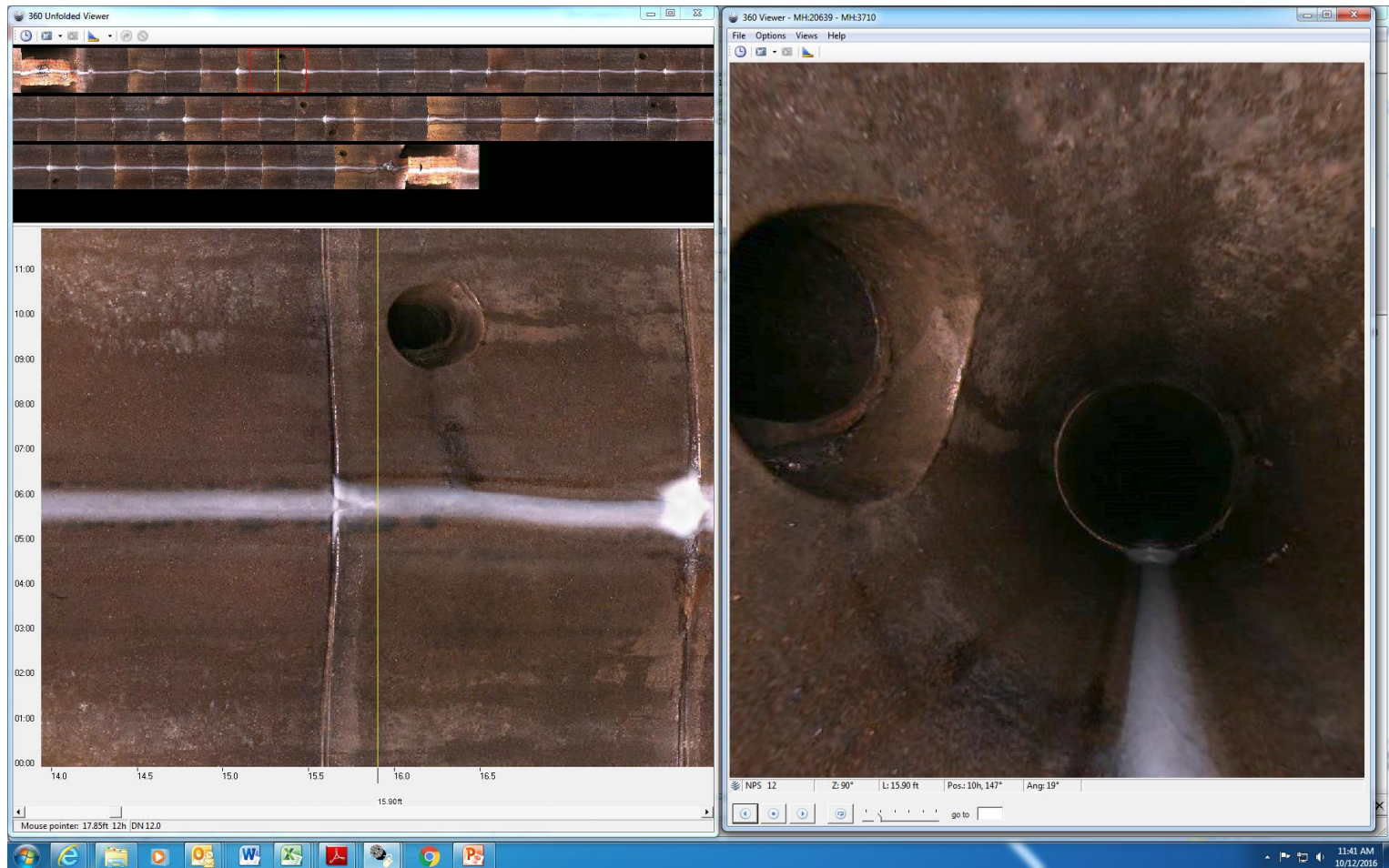
# Pan & Tilt Video



# Panoramo 360 Camera (Sample)



# Panoramio 360 Inspection Video



# Pan & Tilt Camera

## Advantage

- More Sturdy Than Panoramio 360

## Disadvantage

- Inspection Limited to What Camera Points To

# Panoramo 360 Camera

## Advantage

- Reviewer Has Control During Video Review

## Disadvantages

- Higher Sensitive To “Bumps” (Can Lead To Missed Images)
- Poorer Maneuverability (Esp. Thru Curves and Obstructions)
- Not As Good For Observing Certain Types of Infiltration



# Latest Equipment Acquisition: Electro Scan

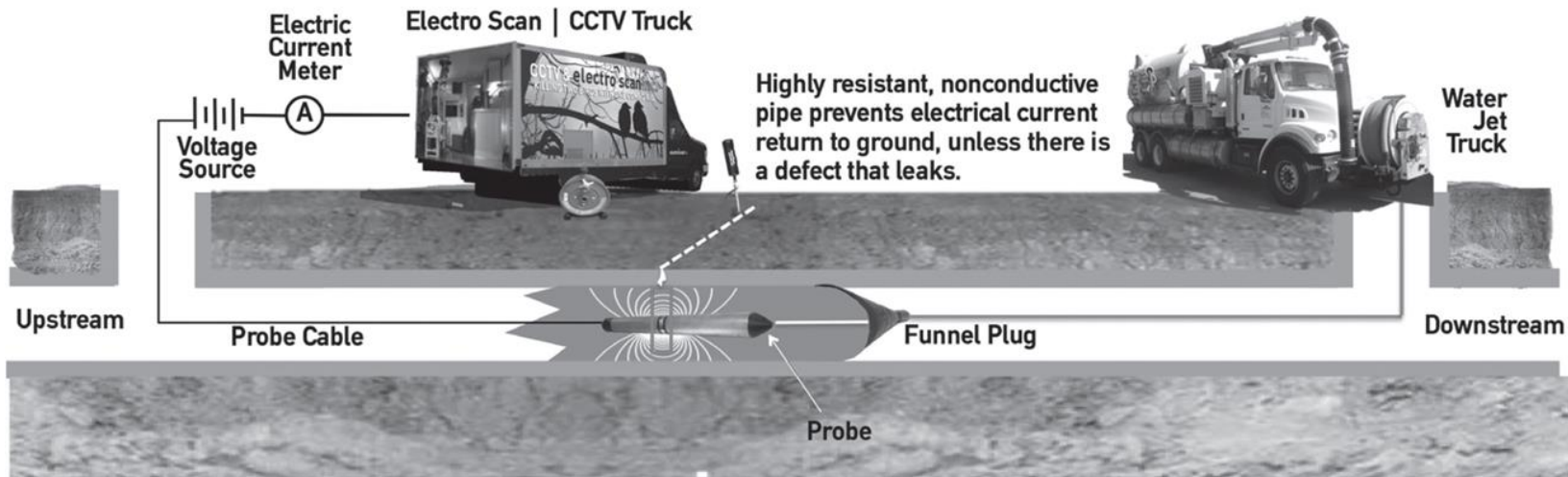
(For Detection of “Leaks” in Sewer  
Due to Openings)



## Electro Scan Truck Model ES-620

(Photo taken from the website [www.electroscan.com](http://www.electroscan.com))

# Electro Scan Summary Schematic

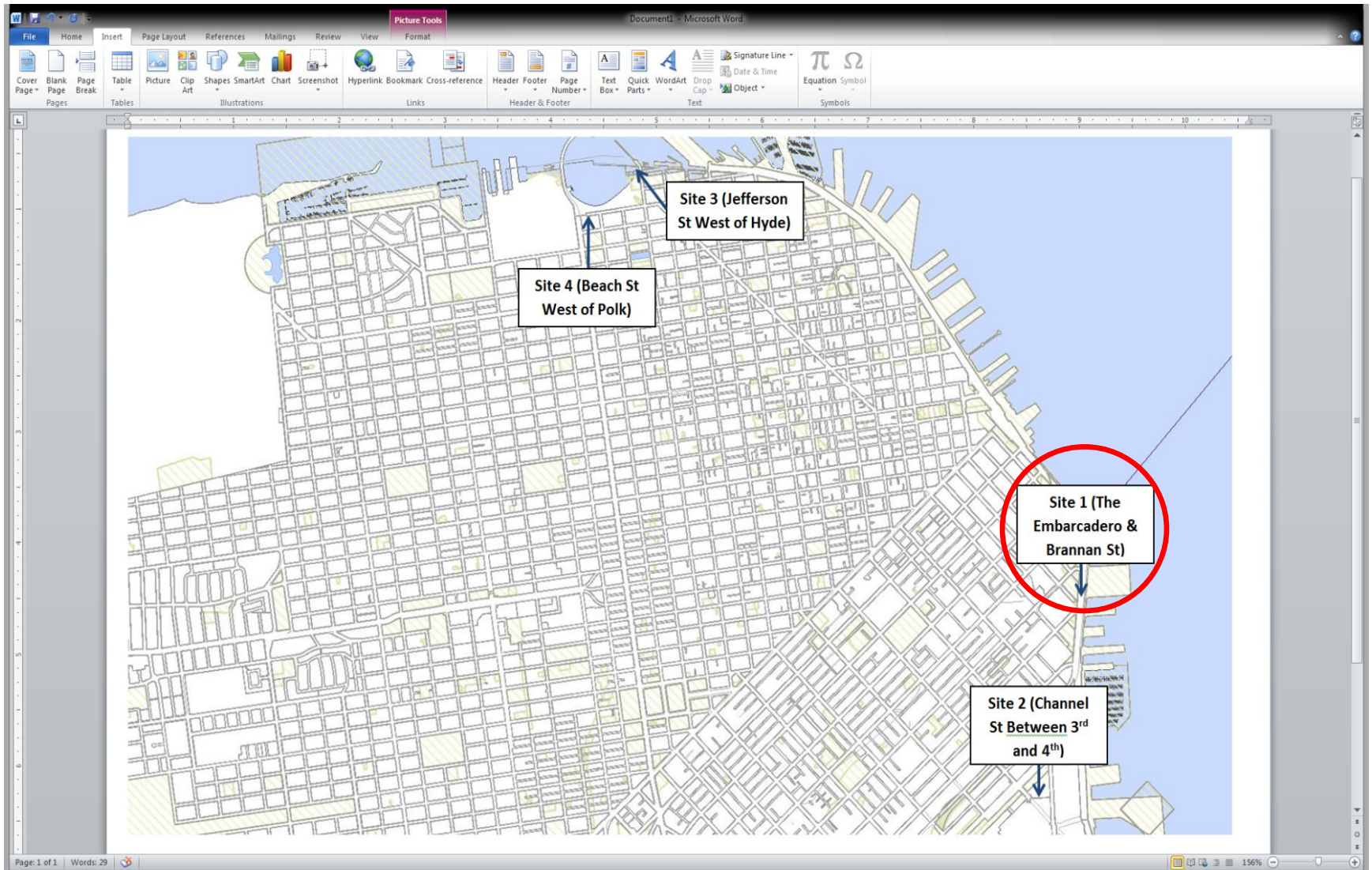


# Electro Scan Demo

San Francisco, CA

September 15 & 16, 2015

# Demo Locations





**Sewers Inspected During Demo**

3773 459	3773 461	3773 421	3773 462	3773 413	3773 392	3773 418
3773 465	3773 466	3773 309	3773 468	3773 530	3773 394	3773 521
3773 509	3773 535	3773 338	3773 547	3773 312	3773 399	3773 331
3773 469	3773 491	3773 359	3773 499	3773 358	3773 400	3773 353
3773 436	3773 453	3773 371	3773 454	3773 369	3773 403	3773 365
				3773 373	3773 405	3773 382

602  
THE EMBARCADERO  
3793 001  
FORMER SEA WALL C31

VACATED C31

3791 002

3793 001

3793 002

3793 003

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## Site 1 (The Embarcadero & Brannan) – Upstream





## Site 1 (The Embarcadero & Brannan) – Downstream





# Electro Scan Demo Truck On Location



## Known Leaking Joint At 12-Inch Sewer





# Electro Scan Probe



# Cone For Directing Nozzle Spray





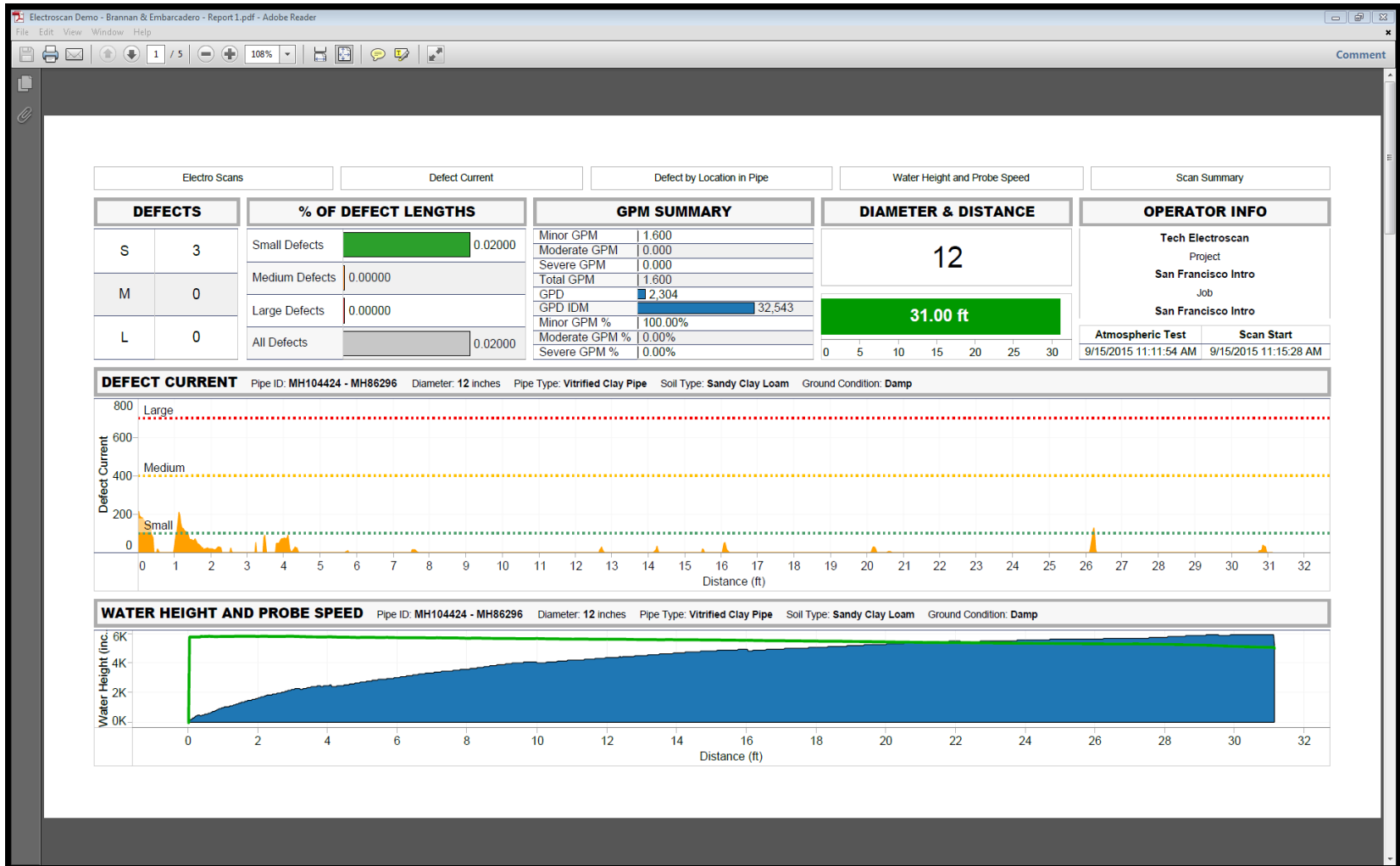
# Lowering Of Probe (Connected to Jetting Nozzle) Into Upstream MH



# Vactor Truck Setup at Downstream MH (For Jetting Nozzle To Pull Probe)

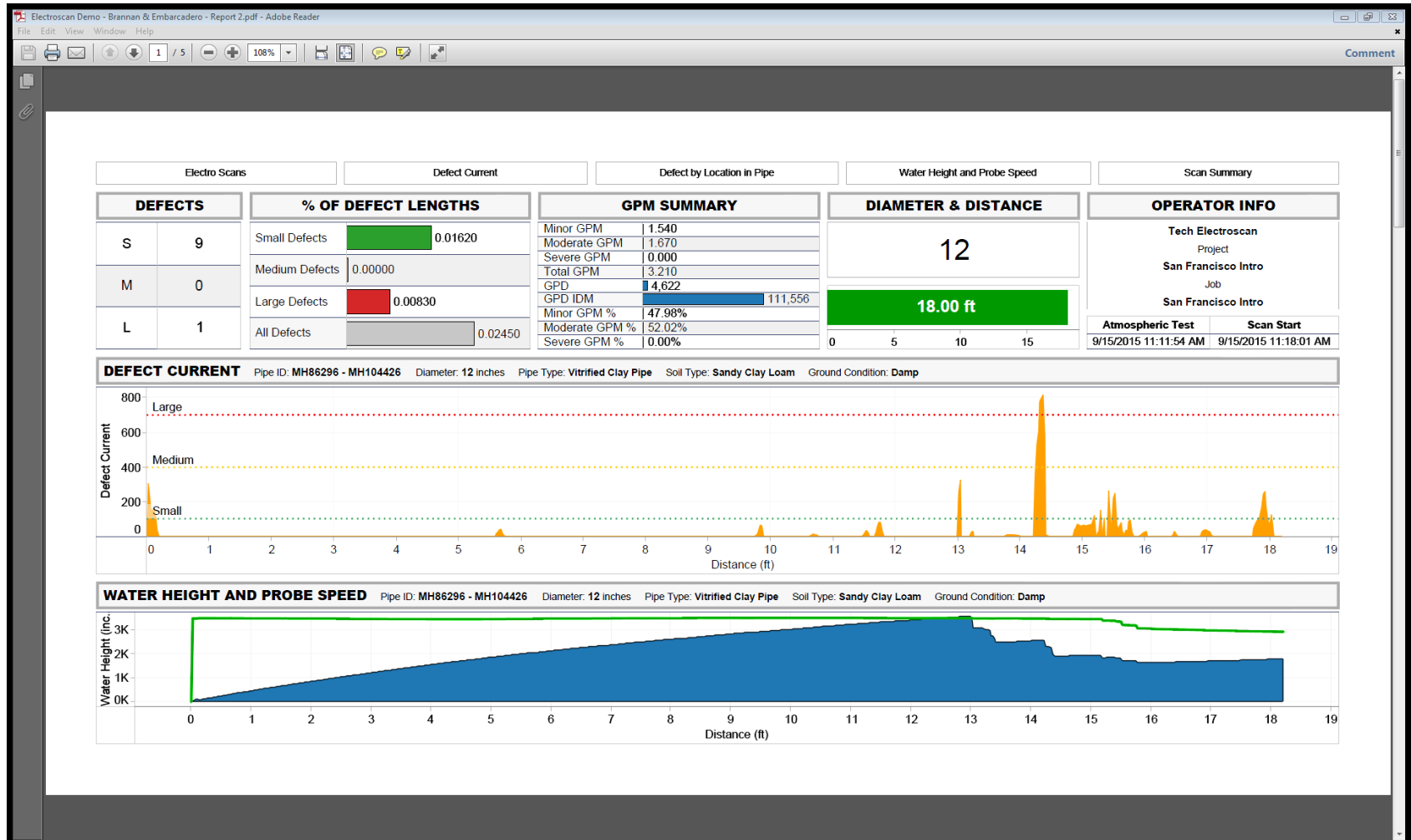


# Electro Scan Report (Page 1 For Segment 1)





# Electro Scan Report (Page 1 For Segment 2)





Data Uploaded To Cloud Server

Assessed Via Critical Sewers

Follow Up With CCTV To View Cause of  
Electro Scan Defects (If Necessary)

# Electro Scan Features Summary

- Can scan pipes up to 30" in diameter
- Probe emits 10 volts, 40 milliamps (Equivalent to 6 AA batteries)
- Assumes 1' of head above pipe (for volume calculations)
- Can scan through grease and roots
- Can be used during wet weather
- No operator error
- Scans upload to cloud within minutes of completion

# Electro Scan “Defects” Definition

## Defects

- Small 100-400  $\mu\text{A}$
- Medium 400-700  $\mu\text{A}$
- Large 700+  $\mu\text{A}$

Infiltration is the defect current x the defect length

# Electro Scan Used For TDML Locations:

1. Candlestick Point
2. Crissy Field
3. Aquatic Park

Sewers sized 15 inches in diameter as less assigned

# Other Inspection Methodologies

1. Pole Cam
2. Sonar (By Contractor)
3. Laser (By Contractor)

# SFPUC "Repair vs. Replacement" Decision Process

http://currents.adl.sfwater.org/sites/csd2/technical/mr/Repair%20vs.%20Replace%20... San Francisco Water Power Se... IBM Electro Scan Inc. | Technology sfwater.org

Suggested Sites Web Slice Gallery Free Hotmail 115

**SFPUC Repair and Replacement Decision Process**  
Repair and Replacement Decision Process for Sewer Pipe

**FINAL**

**Figure 4-1: Repair vs. Replacement Decision Chart**

MAIN SEWER MATERIAL		ISP		VCP / HDPE								BRICK				SRCP / RC / CONC			
		ANY		≥ 12"				< 12"				ANY				ANY			
SIZE		ANY		90" > x ≥ 80"				< 80"				ANY				ANY			
AGE		ANY		≥ 90				< 80				ANY				ANY			
CONDITION		≥ 1 Maj or Med Defect(s)		≥ 1 Maj or Med Defect(s)				≥ 20% of block requires repair due to Maj Defects, Med Defects or Lateral Repairs				≥ 20% of block requires repair due to Maj Defects, Med Defects or Lateral Repairs				≥ 20% of block requires repair due to Maj Defects, Med Defects or Lateral Repairs			
REPAIR HISTORY		ANY		≥ 3 Previous Spot Repairs				≥ 3 Previous Spot Repairs				≥ 3 Previous Spot Repairs				≥ 3 Previous Spot Repairs			
1st Tier RECOMMENDATION		REPLACE		REPLACE / REHAB				REPLACE / REHAB				REPLACE				REPLACE / REHAB			
PAVING		n/a	n/a	n/a	n/a	Concrete Paving	Concrete Paving	Concrete Paving	Concrete Paving	Concrete Paving	Concrete Paving	Concrete Paving	Concrete Paving	Concrete Paving	Concrete Paving	Concrete Paving	Concrete Paving	Concrete Paving	
SOIL TYPE		n/a	n/a	n/a	n/a	ANY	ANY	ANY	ANY	ANY	ANY	ANY	ANY	ANY	ANY	ANY	ANY	ANY	
STREET USE		n/a	n/a	n/a	n/a	ANY	ANY	ANY	ANY	ANY	ANY	ANY	ANY	ANY	ANY	ANY	ANY	ANY	
2nd Tier RECOMMENDATION		See 1st Tier Recommendation	See 1st Tier Recommendation	See 1st Tier Recommendation	See 1st Tier Recommendation	REPLACE	REPLACE / REHAB	REPLACE / REHAB	SPOT REPAIR	REPLACE	REPLACE / REHAB	SPOT REPAIR	REPLACE	REPLACE / REHAB	SPOT REPAIR	REPLACE	REPLACE / REHAB		

**Notes:**

- The decision process generally assumes a minimum of 20 linear feet of pipe per spot repair;
- Assumes there is at least one major or medium defect identified in the main sewer;
- Assumes same size, material, and age for all pipe segments on the block;
- Major Structural Defects (Grade 5 Structural Defects per NASSCO PACP); See Table 4-1 for details:

D	DH	DI	DV	FH3
FSV	HSV	HV	HV	SMW
SMWC	SMW	SMW	SMW	SMW
SRV	SRV	SRV	SRV	SRV
SRV	XB	XP		

- Medium Structural Defects (Grade 4 Structural Defects per NASSCO PACP); See Table 4-2 for details:

D	DP	DP	DP	DP
H	MB	MM	RPLD	RPLD
RPLD	SAM	SAMC	SAMM	SAMZ

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2:40 PM 10/12/2016

# Decision Matrix Developed For Electro Scan Findings

SALTWATER INTRUSION SEWER REPAIR DECISION CHART		
Last Revised September 23, 2016		
DEFECT TYPE / DESCRIPTION		REPAIR RECOMMENDATION
Any Type of defects	Brick Sewers	Replacement (per recent internal proposal)
	Manhole	Manhole Point Repair
	Non-Circular Sewers	Manual Grouting
Significant "Grade 5" Defects (XP, D, BSV, BVV, HSV, HVV, B or H (2 positions or more), FH4, FH3, CH4, CH3)	Any Type of Pipe	Refer to "Repair Vs. Replacement Decision Flowchart"
Defect at Lateral	Break-In and Intuding Lateral	Refer to "Repair Vs. Replacement Decision Flowchart"
	Other Lateral Types	Point Repair
Defective Joint With No Other Main Sewer Defect Involved	Concrete Pipes > 24" Diameter (Any Number of Defective Joints)	Automated Grouting
	Less Than 25 % of Joint On Block Defective	Automated Grouting
	Greater Than 25% of Joints On Block Defective	Pipe Lining
Other Main Sewer Defects (Cracks, Fractures, Small Breaks and Holes)	Less Than 25% of Block Having Defects	Sectional Point Repair
	Greater Than 25% of Block Having Defects	Pipe Lining
Manhole Defects	Any Type Causing Infiltration	Manhole Point Repair
*Note: Prior to assigning repair, research should be performed as to whether sewer assets are on blocks scheduled for projects such as paving, streetscahpe, or others which may result in additional		



# Contractors Used By SFPUC Wastewater Enterprise

National Plant Services

Contact: Michelle Beason

Phone: 925-262-7366

E-Mail: [mbeason@nationplant.com](mailto:mbeason@nationplant.com)

Pipe and Plant Service

Contact: Bill Gilmartin

Phone: 888-978-8264

E-Mail: [bgilmartin@pipeandplant.com](mailto:bgilmartin@pipeandplant.com)

Professional Pipe Services (ProPipe)

Contact: Jason Walborn

Phone: 800-784-7473

E-Mail: [jwalborn@hswcorp.com](mailto:jwalborn@hswcorp.com)

The End